

Oral Presentation (IS-09)

Feline Pelvic Fracture

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INCIDENCE AND IMPACT OF FELINE PELVIC FRACTURE

Pelvic fractures are traumatic injuries that account for approximately 20-32 % of appendicular fractures in cats (1). Among these feline patients, fractures of the pelvic floor are commonly found (90%), while the incidences of the sacroiliac luxation and the ilial body fractures have been reported as high as 60% and 48.5% (2, 3). The causes of pelvic fractures usually involve high impact trauma predominantly road traffic accidents. The patients can suffer significant morbidity and mortality if the concurrent soft tissue injuries were not appropriately diagnosed and managed. The initial assessment of the vital organ systems should be performed to identify life-threatening injuries. The concurrent non-orthopedic injuries can occur as high as 59-72% of the cases and it is of important that the injured patients need to be stabilized before primary repair of the pelvic bone (1).

ANATOMY OF FELINE PELVIS

The pelvis is a box-like structure with interconnection of ilium, pubis, ischium, acetabulum and sacrum. The acetabulum, ilium and sacroiliac joint are weight bearing area of the pelvis. Unlike those of canine, feline ilium is slimmer and straighter, the body of ilium consist of thick cortical bone in contrast to its wing part which mainly composes of the cancellous bone. The sacroiliac joint has both fibrocartilaginous and hyaline parts. The hyaline part is a C-shaped cartilage attached with the sacral wing with the concave side facing towards craniodorsal direction. The pubis and ischium are fused to form a ventral floor and united at the pelvic symphysis (4).

The innervation of the pelvis structures is important for the treatment and prognosis of the feline pelvic fracture. The lumbosacral plexus and sciatic nerve are highly subjected to injury in the cases of vehicle trauma. The lumbosacral trunk comprised of the 6th and the 7th lumbar, and the 1st and the 2nd sacral nerve roots emerges from the ventrolateral aspect sacral bone and courses along the medial wall of pelvis where the sciatic nerve separates and courses caudo-dorsal to the greater trochanter of the femur (5).

GENERAL CONSIDERATIONS AND CONCURRENT INJURIES

The urinary tract disruption and neurological damage are most commonly found among pelvic fracture cases (6). The hindlimb deep pain sensation, motor and sensory function of the tail, pudendal nerve reflexes (urethral sphincter tone, anal sphincter, bulbocavernosus, and perineal reflexes) should be carefully evaluated in every patient. Subluxation or luxation of the coccygeal vertebrae at the base of tail, so called "tail pull injury" can occur when the tail was trapped underneath a car wheel. The traction force related to the struggle of the animal in the accident may stretch the sacrococcygeal nerve root of cauda equina leading to nerve damage (6). The presenting signs include flaccid tail, bladder paralysis and urinary incontinent. The feline patients with intact anal reflex and perineal sensation at 48 hours after trauma are likely to return to normal urinary function. However, the tail function may gain fully recovery by 7-150 days, therefore early tail amputation is not recommended (6).

SURGICAL TREATMENTS OF FELINE PELVIC FRACTURE

The single fracture of the pelvic bone is very uncommon because of the rigid box-like structure of the pelvis. The displacement at one side will cause the displacement of the others (7). In sacroiliac fracture-luxation cases, a unilateral luxation is usually accompanied by at least 1 pelvic fracture or a symphyseal separation (8). The current concepts of feline pelvic fracture management have been shifted from conservative treatment in the past to surgical management in recent years. The consideration criteria for surgical treatment of the pelvic fracture include; the integrity of the weight bearing axis (acetabulum, ilial body and sacroiliac joint), pelvic canal diameter, fracture duration, patient comfort level, concurrent orthopedic injuries, expected treatment outcome and financial limitation (7). The surgical fixation of the pelvic bone will provide the rapid alleviation of pain and discomfort due to the instability of the bone fragments. The anatomical reduction and appropriate fixation of the ilial wing may prevent medial displacement of the bone fragments thus the width of pelvic canal

can be maintained.

Several techniques for pelvic fracture repair in cats have been described. The lateral and dorsal plating for the fixation of ilial body fracture have been studied in cats using 2.0 mm (1.0 or 1.5 mm thickness) dynamic compression plate (2, 3). The straight ilial body of the cats offers the possibility to apply dorsal bone plate. Comparing to lateral plating, the dorsal plating technique enables the use of longer plate and a better screw purchasing onto the bone leading to rigid fixation with lesser chance of screw loosening (3). The composite fixation of comminuted ilial wing fracture in cat has been documented using the combination of pin, screws, wire and polymethylmethacrylate (PMMA). The successful outcome with satisfactory bone healing can be achieved (9). The acetabular fracture fixations by 2.0-2.7 mm bone plate as well as tension band stabilization have been successfully reported in felines (10). However, the comminution of the acetabulum may prevent the anatomical reconstruction of the articular surface. In such cases, the femoral head and neck excision is an affordable method of choice (7). Alternatively, the surgical repair to allow the secondary bone healing can be performed prior to the consideration of the total hip replacement (7).

The sacroiliac joint fracture or luxation are common in cats that encountered a blunt trauma to the hind quarter. The surgical intervention is indicated if the feline patients are in painful condition, nonambulatory or demonstrate severe neurological deficit or pelvic canal narrowing. The fixation methods include screw insertion in lag fashion, transilial pins or combination of transiliosacral rod with tension band technique. Pelvic floor fractures are classified as symphyseal separation, fracture of the pubic body or ramus and ischial body (7, 8, 11). The fixations of these parts are indicated if the marked instability of fragments is detected. Fixations of pelvic floor fractures can be performed using bone plate and screw (12).

POST-OPERATIVE MANAGEMENT AND COMPLICATIONS OF FELINE PELVIC FRACTURE

Generally, cage confinement for 2- 4 weeks and follow by restriction of activity up to 6 weeks are recommended. The radiographic examination should be performed at 4-6 weeks post operatively to assess the stability of the implants and bone healing (7). Rehabilitation techniques for pain and inflammation reduction should be started post-operatively including thermal modalities (cold and heat applications), transcutaneous electrical stimulation, therapeutic ultrasound and laser therapy etc. Therapeutic exercises, for instance, assist standing, weight shifting, balancing exercise will help promote muscle strength and proprioception. Urination can be managed through dwelling urinary catheter and gentle

manual expression of bladder. High fiber diet, stool softeners or enema applications may be prescribed to prevent or treat the conditions of constipation and obstipation. Pelvic canal narrowing can result in chronic constipation. The surgical intervention for widening of pelvic canal or subtotal colectomy may be indicated if constipation persists longer than 6 months (4). A long-term follow up study in 43 cats undergone surgical management has reported excellent outcomes with 22% complication rate (1). The most common complication is transient neurapraxia associated with sciatic impairment (1).

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